SUPERVISOR'S DECLARATION

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the degree in Civil Engineering

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STUDENT'S DECLARATION

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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EFFECT OF CRUDE PALM OIL (CPO) AS AN ALTERNATIVE ADDITIVE TO THE BINDER IN ASPHALT MIXTURE

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ABSTRAK

Asfalt campuran suam (WMA) yang dihasilkan pada suhu yang lebih rendah daripada panas-campuran asfalt (HMA) untuk mengurangkan suhu asfalt untuk tujuan kos tenaga boleh disimpan. Suhu pengeluaran untuk memanaskan campuran asfalt biasanya sekitar 130 ° C hingga 150 ° C. Objektif kertas kajian ini memberikan potensi kajian selain minyak sawit mentah (CPO) sebagai bahan tambahan untuk asfalt campuran turapan. Jumlah reka bentuk campuran konkrit asfalt dengan tambahan 0.5% daripada CPO telah disediakan mengikut spesifikasi JKR. Penggredan digunakan adalah AC 14 untuk menentukan kawalan kandungan asfalt optimum. Pencampuran dan pemadatan suhu telah dipilih di 120,130,140°C. Semasa pencampuran, yang telah ditentukan kandungan asfalt optimum iaitu 5% dan 0.5% daripada CPO OAC ditambah ke dalam campuran konkrit asfalt. Semua sampel campuran adalah berdasarkan Kaedah Campuran Marshall. Dalam kajian ini, sifat-sifat isipadu seperti lompang dalam jumlah campuran (VTM), lompang dipenuhi dengan asphalt (VFA), ketumpatan pukal (Gmb) dan lompang dalam agregat mineral (VMA) telah dikaji. Dalam kajian ini, penambahan kandungan minyak sawit mentah (CPO) adalah alternatif kepada asfalt konvensional kerana ia boleh dihasilkan pada suhu rendah kira-kira 120 ° C.

ABSTRACT

Warm mix asphalt (WMA) produced in the lower temperature than Hot-mix asphalt (HMA) to reduce the temperature of asphalt for purpose of energy costs can be saved. The production temperatures for warm-mix asphalt are normally around 130°C to 150°C. The objective of this research paper presents a study potential of addition Crude Palm Oil (CPO) as additive to asphalt pavement mix. A total of asphaltic concrete mix designs with 0.5% addition of CPO were prepared in accordance with the JKR Specification. The gradations used are AC 14 to determine the control optimum asphalt content. The mixing and compaction temperatures were selected at 120,130,140°C. During mixing, the determined optimum asphalt content which is 5% and 0.5% of CPO of OAC added into asphaltic concrete mix. All the mix samples were based on the Marshall Mix Design Method. In this study, the volumetric properties such as voids in Total Mix (VTM), voids filled with Asphalt (VFA), bulk density (Gmb) and voids in mineral aggregates (VMA) were investigated. In this study, addition of Crude Palm Oil (CPO) content is an alternative to the conventional asphalt as it can be produced at lower temperatures of about 120°C.

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LIST OF ABBREVIATIONS

AC10	asphaltic concrete with NMAS of 10mm
AC14	asphaltic concrete with NMAS of 14mm
WMA	Warm mix asphalt
HMA	Hot mix asphalt
PM	Particulate matter
CPO	Crude Palm Oil
JKR	Jabatan Kerja Raya
CO2	Carbon Dioxide
NOx	Nitrogen Oxide
SO2	Sulphate Dioxide
CO	Carbon Oxide
DAT	Dispersed Asphalt Technology
SSD	Saturated Surface Dry
LA	Los Angeles
VTM	Voids in Total Mix
AASHTO	American Association of State Highway and Transportation Official
VMA	Voids in Mineral Aggregates
VFA	Void filled Mineral Asphalt
ASTM	American Society for Testing and Materials
MS	Malaysia Standard
Gm	Specific Gravity of Mix
VS	Versus

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